ADDON HP2100

User Manual

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1 Introduction

The ADDON HP2100 is a mini-PLC adapter. It can transmit data up to 200Mbps in the household powerline. It can be connected to the power socket directly without new wire. The ADDON HP2100 adapter can enter power save mode triggered by multiple conditions. It can help you to establish a high-speed network that supports video, voice and data without wiring and drilling. It is suitable for using in a wide range of both residential (at home) and commercial (offices, apartments, hotels, warehouses) network applications.

1.1 Product Features

- Without new wiring, every power socket becomes a connection node in the household.
- Plug-and-play to your routers, computers and other network devices.
- Provides power save mode. In the power save mode, the output consumption of the device is less than 0.5W.
- The physical data rate is up to 200Mbps.

1.2 Application

- High Definition (HD) and Standard Definition (SD) video distribution
- Higher data rate broadband sharing for powerline LAN
- Shared broadband internet access
- TV over IP (IPTV) and Voice over Internet Protocol (VoIP)

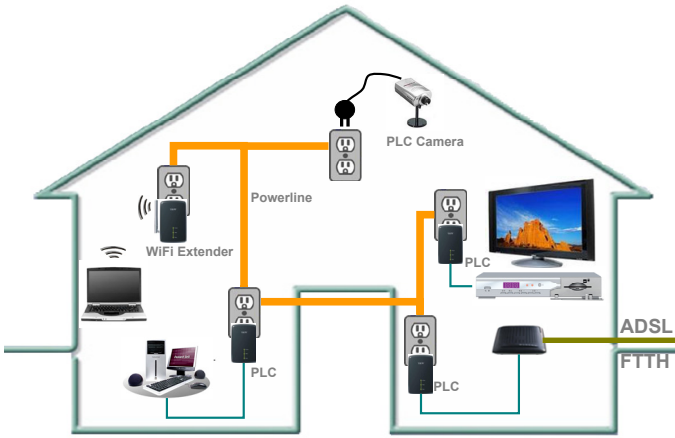

Figure 1 PLC network architecture

1.3 System Requirements

- Operating system: Windows 98SE, 2000, ME, XP 32/64 bit and Vista 32/64bit
- CPU: Intel Pentium III or higher, clock rate faster than 2.0GHz recommended
- RAM: At least 128MB
- Screen resolution: Any resolution
- Free disk space: At least 20MB
- Network interface: At least one Fast Ethernet (100 Mbps) network card, and a Ethernet Cord

1.4 Packing List

- ADDON HP2100 x 2
- CD ROM x 1
- RJ45 Ethernet cable x 2

2 Safety Precautions

This device is intended for connection to the AC powerline. For installation instructions, please refer to the installation section of this guide. The following precautions should be taken when using this product.

- Read all instructions before installing and operating this product.
- Follow all warnings and instructions marked on the product.
- Unplug the device from the wall outlet before cleaning. Use a damp cloth for cleaning. Do not use liquid cleaners or aerosol cleaners.
- Do not operate this product near water.
- Keep the device away from a radiator or heat register.
- Do not use an extension cord between the device and the AC power source.
- Only a qualified technician should service this product. Opening or removing covers may result in exposure to dangerous voltage points or other risks.
- Do not plug the device into a power strip or surge protector because these devices may consist of filter and impair signal.
- Avoid plugging the device right next to noisy sources such as cell phone charger, Halogen light, noisy desktop computer, vacuum cleaner, etc. These cases result in poor transmission speed.
- Unplug the device from the wall outlet and refer the product to qualified service personnel for the following conditions:
  - If liquid has been spilled into the product
  - If the device has been exposed to rain or water
  - If the device does not operate normally when the operating instructions are followed
  - If the device exhibits a distinct change in performance

3 Getting to Know the Adapter

3.1 The Ethernet Interface

Ethernet: Ethernet port. Connect one end of an Ethernet network cable to PLC's Ethernet port and the other end to your computer or other Ethernet-enabled network device.

3.2 The Adapter's Buttons

Figure 2 Side panel of the device

Security\Reset: Set the status of the device members or restore the factory default settings.

- Pressing and holding the **Security\Reset** button for less than 3 seconds makes the adapter a member of the existing AVLN. Pressing and holding the Button for between 5 and 8 seconds makes the adapter getting a random NMK. Pressing and holding the Button for between 10 seconds and 15 seconds makes the adapter restore the factory default settings. For more details, see chapter 5 .

3.3 The Adapter's LEDs

The adapter's LEDs are located on the front panel. There are 3 LEDs to indicate the adapter's status.

Figure 3 Top view

The following table describes the LEDs on the device.

LED	Color	Behavior	Description
(Power)	Green	On	System runs normally.
	Green	Blink	● System is resetting. ● System is in the process of password synchronization.
	-	Off	The PLC adapter is powered off.
(Ethernet)	Green	On	Ethernet connection has established.
		Blink	The device is receiving or transmitting data via the Ethernet interface.
	-	Off	No Ethernet connection.
	Green/Orange/Red	On	The device has connected to the power line network. The

LED	Color	Behavior	Description
(Data)			**Data** LED color will vary with the physical rate. ● Green: Link Rate > 40 Mbps ● Orange: 20 Mbps< Link Rate <40 Mbps ● Red: Link Rate< 20 Mbps
	-	Off	The adapter has not found any other compatible powerline devices that use the same encryption key.

How to Install the Utility

Note:

Before installing the PLC utility software, make sure that there is no any other powerline utility installed on your computer. If there is another utility installed, please uninstall it and restart your computer.

Follow the steps below to install the utility. No password or CD-Key is needed.

Step 1 Please insert the utility CD into the computer's CD-ROM drive. Select the **ADDON HP2100 Utility Installation** folder and then double-click the setup.exe. The page for installing the utility software is displayed.

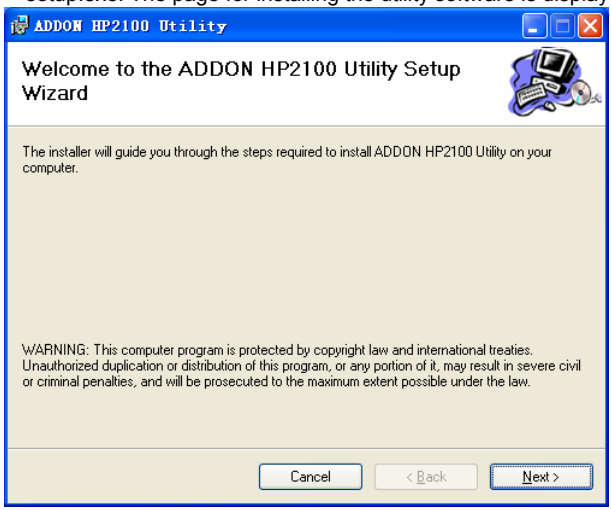

Figure 4 Open the setup wizard

Step 2 Click **Next** to display the following page.

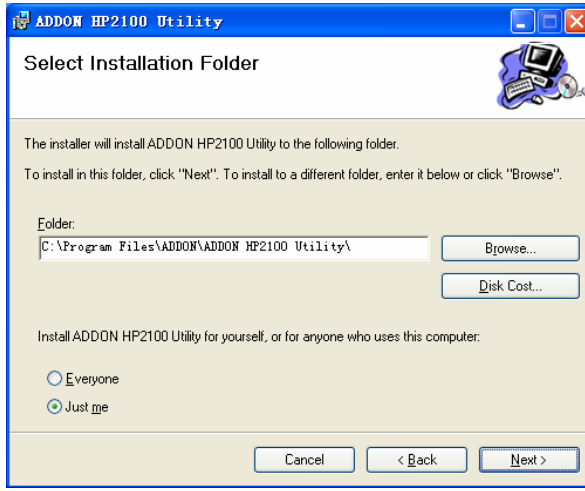

Figure 5 Select the folder

Step 3 Click **Browse…** to select the installation folder, and then click **Next** to continue.

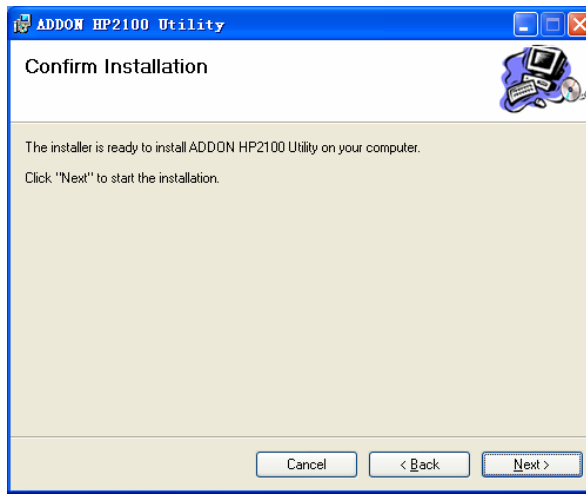

Figure 6 Confirm installation

Step 4 Click **Next** to display the following page.

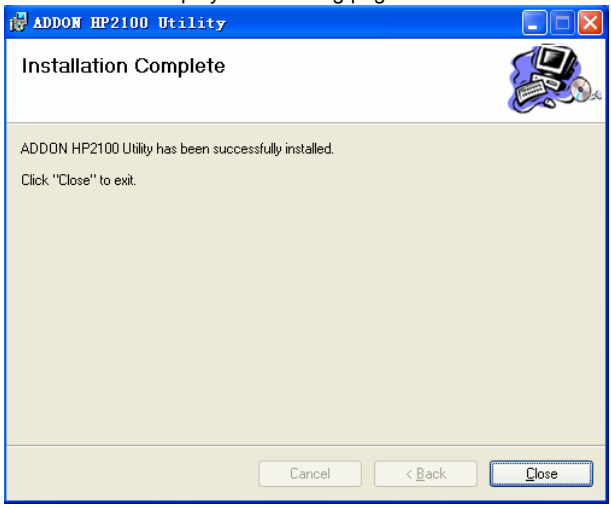

Figure 7 Complete the installation

Step 5 Click **Close** to finish the installation.

4 How to Use the Utility

Click the desktop icon below to enter the configuration page.

Figure 8 Desktop icon

4.1 Main Tab

The **Main** screen provides a list of all powerline devices logically connected to the computer when the utility is running.

The top panel shows the local HomePlugAV devices connected to the network interface card (NIC) of the computer. Click **Connect**. The utility automatically scans the powerline periodically for other HomePlugAV devices connected to it. If no local HomePlugAV device is discovered, the status bar displays **HomePlug Adapter NOT DETECTED**.

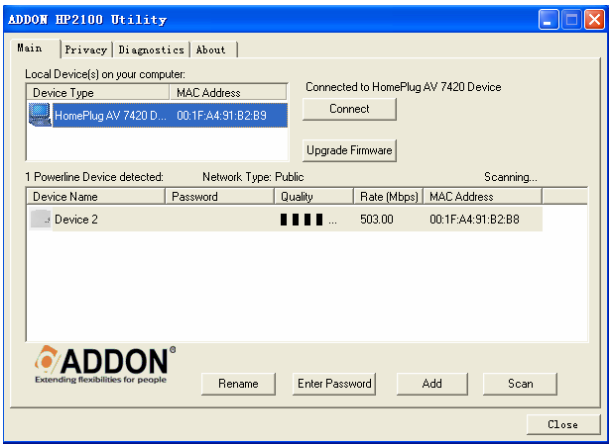

Figure 9 Main tab

The lower panel displays all the HomePlugAV remote devices, which are discovered in the current logical network. The total number of remote devices connected in the same network is displayed above the remote device panel. **Network type** (**Public** or **Private**) depends on the network status of the local device. **Autoscan** shows whether the autoscan function is on. The following information is displayed for all the devices that appear in the lower panel.

Device Name

This column shows the default device name, which may be modified. To change the name, click **Rename**, or click the name and edit it in the list.

MAC Address

This column shows the MAC addresses of the remote devices.

Password

By default, this column is blank. You can click **Enter Password** to change it. The steps for setting the password of the device (required when creating a private network) are as follows:

Step 1 Click the device name to select the device in the lower panel.

Step 2 Click **Enter Password**. A dialog box appears, showing the device name and password. See **Figure 5**.

Figure 5 Set the device password

Step 3 Enter the password. Click **OK** to verify the password. The password is case-sensitive.

A confirmation box appears if the password is entered correctly. If a device is not found, a message appears, providing suggestions to solve the common problems. This process might take a few seconds to get completed.

Add

This button is used to add a remote device to the existing network by entering the device password of the device. A dialog box appears. See **Figure 6**. You can enter a device name and the password.

If the device is found and the password is entered correctly, a confirmation box appears. If a device is not found, a message appears, providing suggestions to solve the common problems.

Figure 6 Add the remote device

Note:

The device must be in the powerline (plugged in), so that you can confirm the password and add the device to the network. If the device is not located, a warning message appears.

Scan

This button is used to perform an immediate search for HomePlugAV devices connected to the powerline network. By default, the utility automatically scans every a few seconds and updates the displayed information.

4.2 Privacy Tab

In the **Privacy** screen, you can maintain security for the logical network and select the device included in the network. See **Figure 7**.

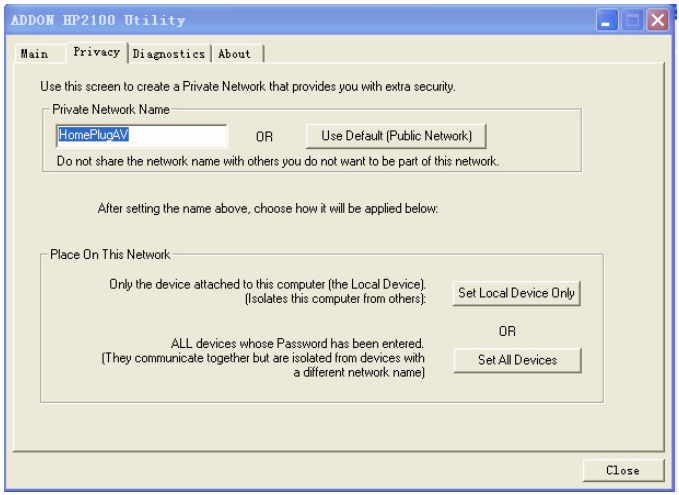

Figure 7 Privacy tab

All HomePlugAV devices are loaded using a default logical network (network name), which is normally **"HomePlugAV"**. In the **Privacy** screen, you can modify a private network by changing the network names.

You can always reset to the HomePlugAV network (Public) by entering "HomePlugAV" as the network name or by clicking on the **Use Default** button.

Note:

If the network name changes to anything other than HomePlugAV, the network type in the main screen is displayed as **Private**.

Set Local Device Only

This button is used to change the network name of the local device. If a new network name is entered, all the devices appeared in the main panel prior to this are no longer present in the new network, effectively making the local devices not to communicate to the devices which are in the old logical network. Click **Set Local Device Only**, the devices previously set up with the same logical network (same network name) appears in the device list.

Set All Devices

This button is used to change the logical network of all devices that appear in the main panel. If these devices whose passwords have been entered for the same logical network, a dialog box appears, indicating the success of this operation. For the devices whose passwords are not entered, this operation will fail and it will report a failure message.

4.3 Diagnostics Tab

The **Diagnostics** screen shows the system information and history of all remote devices appeared over a period of time. See **Figure 7**.

The **Upper panel** shows technical data concerning software and hardware on the host computer that are used to communicate through HomePlug on the powerline network. It includes the following:

- Operating system platform/version
- Host network name
- User name
- MAC address of all NICs (Network interface card) connected to the host
- Identify versions of all driver DLLs and libraries used (NDIS) and optionally
- HomePlug chipset manufacturer name (Turbo Only devices)
- Firmware version
- MAC addresses of all devices connected locally to the host
- Version of the configuration utility
- Vendor name

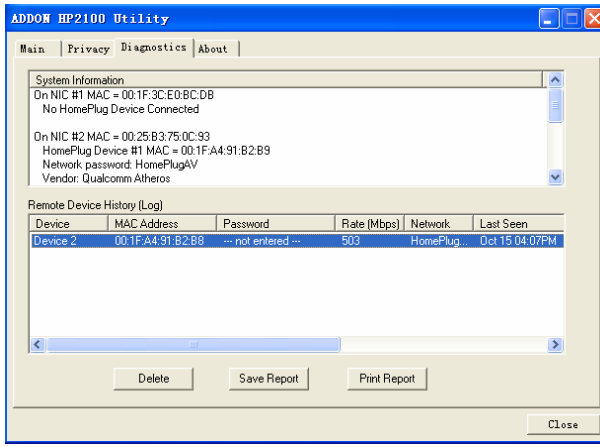

Figure 8 Diagnostics tab

The **Lower panel** displays the history of all remote devices appeared on the computer over a certain period of time. All the devices and the parameters of the devices on the powerline network are listed. Devices that are active on the current logical network show a transfer rate in the rate column. Devices on other networks, or devices that no longer exist are shown with a "?" in the rate column. The following remote device information is available from the diagnostics screen:

- Device alias name
- MAC address
- Password
- Device last known rate
- Device last known network name
- HomePlug chipset manufacturer name
- Date device last seen on the network
- Firmware version

The diagnostics information displayed can be saved to a text file for later use, or be printed for reference for a technical support call. Click **Delete** to delete the devices which are no longer part of the network. A dialog window pops up with a confirmation message if the user wants to delete a device whose password has been entered.

4.4 About Tab

The **About** screen shows the software version and provides an html link to a website, such as *http://www.qua.qualcomm.com*. Clicking the web address, you can visit the website.

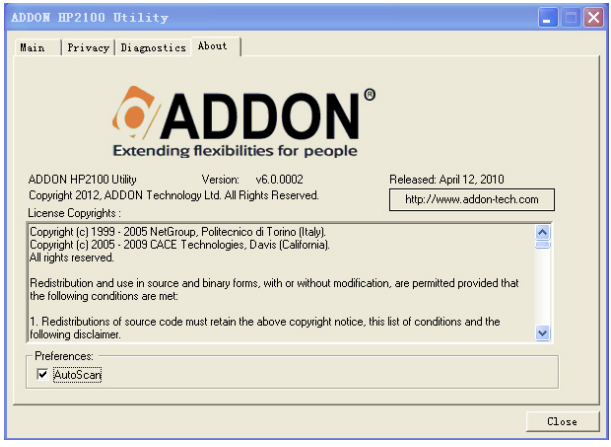

Figure 9 About tab

Preferences

The lower panel displays options for turning the autoscan function on or off.

5 Forming a HomePlug AV logical network

This chapter describes how to form a HomePlug AV logical network (AVLN) using the Security/Reset pushbutton.
Operation progress and results can be monitored by observing the behavior of the Power and Data indicators.

Scenario:
Devices A and B with different NMK values are connected to the same powerline. Users want to use them to form a logical network.

Figure 10 Forming a HomePlug AV logical network

Do as follows to form a logical network using the Security/Reset button:

Step 1 Press the **Security\Reset** pushbutton on device A or B for 5 to 8 seconds. The device will reset and restart with a random NMK

Step 2 Press the **Security\Reset** button on device A for less than 3 seconds.

Step 3 Within 2 minutes, press the **Security\Reset** button on device B for less than 3 seconds.

Step 4 Wait for connection to complete.

The Power indicator on both devices will flash evenly at 1 second interval until the operation succeeds or fails. If the connection succeeds, the Power indicators on both devices illuminate steadily, and Data indicators on both devices also illuminate steadily. If the connection fails, the Power indicators on both devices keep steady on, but the Data indicators on both devices are off. In that case, repeat steps 1-4.

6 Joining a Network

This chapter describes how to add a device to an existing HomePlug AV logical network (AVLN) using the Security/Reset pushbutton.

Operation progress and results can be monitored by observing the behavior of the Power and Data indicators.

Scenario:

Devices A and B are located in Network N. Users want to add device C (the joiner) into Network N. Any devices on Network N can become the 'adder'.

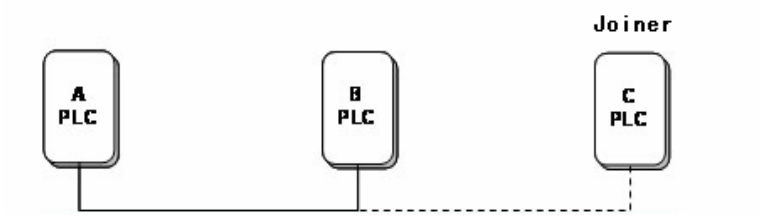

Figure 11 Join a network

Do as follows to add device C to Network N using the Security/Reset button:

Step 1 Press the **Security\Reset** pushbutton on the "Joiner" for 5 to 8 seconds. The device will reset and restart with a random NMK

Step 2 Press the **Security\Reset** button on device C (the 'joiner') for less than 3 seconds, making it the 'adder'.

Step 3 Within 2 minutes, press the **Security\Reset** button device A (or device B) for less than 3 seconds.

Step 4 Wait for connection to complete.

The Power indicator on device A (or device B) and device C will flash at 1 second intervals until the process succeeds or fails. If the connection succeeds, the Power indicators on both devices illuminate steadily, and Data indicators on both devices also illuminate steadily. If the connection fails, the Power indicators on both devices keep steady on, but the Data indicators on both devices are off. In that case, repeat steps 1-4.

7 Leaving a Network

This chapter describes how to remove a device from an existing HomePlug AV logical network (AVLN) using the Security/Reset pushbutton.

Operation progress and results can be monitored by observing the behavior of the Power and Data indicators.

Scenario:

Device C is located in a network. Users want to remove device C (the 'leaver') from its network.

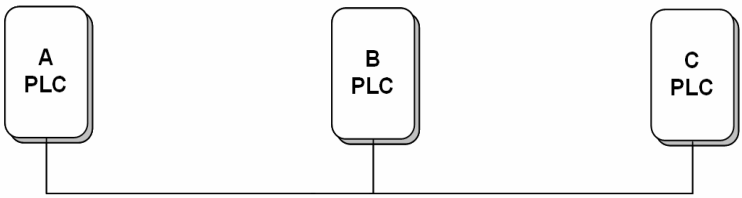

Figure 12 Remove a device from a network

Do as follows to remove device C from Network N using the Security/Reset button:

Step 1 Press the **Security\Reset** pushbutton on device C (the 'leaver') for 5 to 8 seconds. Device C resets and restarts with a random NMK.

Step 2 Wait for the reset to complete.

The Power indicator on device C momentarily extinguishes during reset, blinks during restart, and then illuminates steadily.

After device C is removed from its existing network, users can disconnect the device from the medium or join it to another logical network on the same medium.

8 How to Improve the Transmission Capacity

It is important to use the PLC product complying with the following "correct rules", because it can significantly improve the transmission capacity of the network.
For the PLC device without a female socket, it is recommended to plug the device directly into a wall socket instead of a power strip.

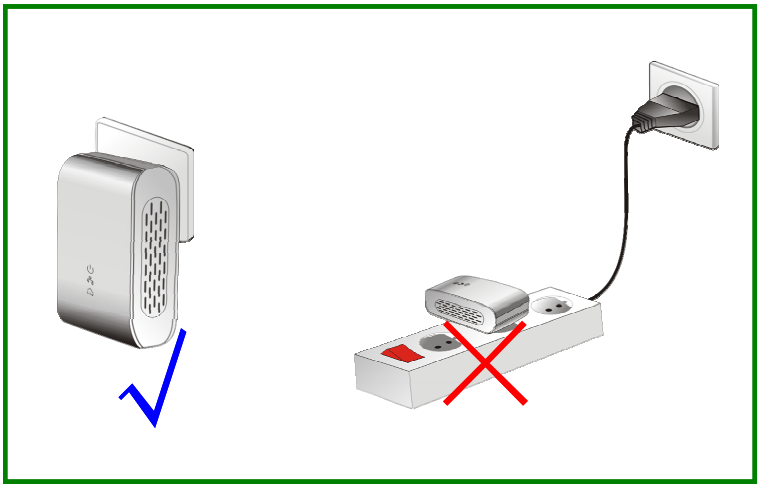

Figure 13 Connecting the PLC device without the female socket

Appendix A Specifications

Chipset	QCA6410
Protocol	HomePlug AV, IEEE1901 Co-exists with existing HomePlug 1.0
System Support	Windows 98SE, 2000, ME, XP 32/64 bit and Vista 32/64bit
PLC PHY Rate	200Mbps (Max)
Modulation Band	2~30MHz
Modulation Schemes	Supports OFDM 4096/1024/256/64/16/8-QAM, QPSK, BPSK and ROBO
Encryption	128 AES
LED's	Power, Ethernet, Data
Push Button	Reset: Restore the factory default settings Security: Set the network password automatically or get a random NMK
Consumption	1.6W
Operating Temperature	0ºC to 40ºC
Storage Temperature	-20ºC to 70ºC
Operating Humidity	10% to 90%, non-condensing
Storage Humidity	5% to 95%, non-condensing
Input Rating	100-240 VAC, 50/60Hz
Certifications	CE, UL, FCC Part 15 Class B
Green Standard	RoHS
Physical Dimension	L×W×H: 69mm×58mm×31mm
Weight	75g

Appendix B Acronyms and Abbreviations

AVLN	AV In-home Logical Network, the AVLAN is the set of STAs that possess the same network membership key. Every AVLN is managed by a single CCo.
CCo	Central Coordinator
CSMA/CA	Carrier Sense Multiple Access / Collision Avoidance
DAK	Device Access Key
DM	Device Manager
IGMP	Internet Group Management Protocol
NEK	Network Encryption Key
NID	Network ID (Identification)
NMK	Network Membership Key
PLC	Powerline Communication
PIB	Parameter Information Block
STA	Station, a STA in the network with a connection to the powerline and being able to source or sink traffic
TDMA	Time Division Multiple Access
TEI	Terminal Equipment Identifier
TOS	Type Of Service
VLAN	Virtual Local Area Network